

Amendments to the Claims

Listing of claims:

1. (Currently Amended) A composite of a vulcanizable composition selected from a group consisting of natural rubbers, synthetic rubbers and thermoplastic elastomers and having at least one metal reinforcement element embedded therein, wherein the metal reinforcement element has a coating of a polymer deposited from a solution and compatible with and co-polymerizable with said vulcanizable composition, and bearing functional groups covalently bonding to the metal surface of said reinforcement element, wherein the functional groups are ~~selected from the group consisting of~~:

~~thiol groups, mercapto groups, silanes, amines,~~
~~-SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂);~~
~~-Si(OR')₃; -Si(R'(OR')₂);~~
~~-PO₃H₂, -SO₂H,~~
~~acid anhydrides of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂);~~
~~-PO₃H₂, -SO₂H,~~
~~acid chloride groups of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂);~~
~~-PO₃H₂, -SO₂H,~~
~~organometallic groups of the formula -M(OR')_n -M(Cl')_n, whereby wherein M is a metal selected from the group consisting of Al, Sn, B, Ti and V; and n is the ligand number of ligands corresponding to the metal M; and~~
~~a phthaloeyanin, phthalonitril groups, a monothiol, or monothiolate groups; and R' is an alkyl selected from the group consisting of methyl, ethyl or propyl.~~

2. (Original) A composite according to claim 1, wherein said solution is an aqueous solution.

3. (Original) A composite according to claim 1, wherein said solution is an alcoholic solution.

4. (Original) A composite according to claim 1, wherein said solution is an organic solution.

5. (Original) A composite according to claim 1, wherein said metal reinforcement elements have a coating of a non-cured rubber composition.

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Original) A composite according to claim 1, wherein said metal reinforcement elements comprise on top of said coating, a layer of a skim composition for the vulcanizable composition.

10. (Original) A composite according to claim 1 wherein the vulcanizable composition to be reinforced is a composition selected from the group consisting of a synthetic poly(isoprene), a natural poly(isoprene), a synthetic poly(butadiene), natural poly(butadiene), a styrene-butadiene-rubber (SBR), a halobutylrubber, and an ethylene-propylene-diene-rubber (EPDM).

11. (Original) A composite according to claim 1, wherein said metal reinforcement element is an elongated steel element.

12. (Original) A composite according to claim 11, wherein said elongated steel element is coated with at least one metallic layer.

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13. (Original) A composite according to claim ~~12~~, wherein said metallic layer is comprised of a metal selected from the group consisting of brass, bronze, zinc, zinc alloy, tin and tin alloy.

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14. (Original) A composite according to claim ~~13~~, wherein said zinc alloy is an alloy selected from the group consisting of a zinc-aluminium alloy, a zinc-aluminium-mischmetal alloy, a zinc-manganese alloy, a zinc-cobalt alloy, a zinc-nickel alloy, a zinc-iron alloy and a zinc-tin alloy.

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Original) A composite according to claim 1, wherein said functional groups are carried along a polymer backbone.

19. (Original) A composite according to claim 1, wherein said functional groups are part of side chains of the polymer.

20. (Original) A composite according to claim ~~18~~, wherein said functional groups are epoxy groups carried along the polymer backbone.

21. (Original) A composite according to claim ~~18~~, wherein said functional groups are epoxy groups which are part of side chains attached to the polymer backbone.

22. (Canceled)

23. (Canceled)

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24. (Currently Amended) A composite of a vulcanizable composition selected from a group consisting of natural rubbers, synthetic rubbers and thermoplastic elastomers and having at least one metal reinforcement element embedded therein, wherein the metal reinforcement element has a coating of a polymer deposited from a solution and compatible with and co-polymerizable with said vulcanizable composition, and bearing functional groups covalently bonding to the metal surface of said reinforcement element, wherein the functional groups are selected from the group consisting of:

thiol groups;

-SiHCl2, -SiH2Cl, -Si(Cl)3, -SiHBr2, -SiH2Br, -SiBr3, -Si(R'(Cl)2), -Si(OR')3, -Si(R'(OR')2), wherein R' is an alkyl selected from the group consisting of methyl, ethyl, and propyl;

amines;

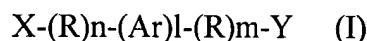
-PO3H2, -SO2H;

the acid anhydride group of -SiHCl2, -SiH2Cl, -Si(Cl)3, -SiHBr2, -SiH2Br, -SiBr3, -Si(R'(Cl)2), -Si(OR')3, -Si(R'(OR')2), -PO3H2, and -SO2H;
the acid chloride group of -SiHCl2, -SiH2Cl, -Si(Cl)3, -SiHBr2, -SiH2Br, -SiBr3, -Si(R'(Cl)2), -Si(OR')3, -Si(R'(OR')2), -PO3H2, and -SO2H;

phthalocyanin groups; and

phthalonitril groups;

according to claim 1, wherein the functional groups are carried as terminal groups, carried along the polymer backbone, or carried as part of side chains; and
wherein said polymer is bound to said metal surface by an adhesion promoter that is a bifunctional compound of the general formula (I)



with X representing a group capable of reacting covalently at the metal surface,

R representing an organic spacer chain,

Ar representing an aromatic heteroaromatic system,

Y representing a group capable of forming covalent bonds to the functional groups of said coating, and $0 \leq n, m \leq 16$; and $0 \leq l \leq 6$, and $n + m + l \neq 0$.

25. (Cancelled)

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26. (Currently Amended) A composite according to claim 24 wherein X is a functional group selected from the group consisting of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; -PO₃H₂; -SO₂H; an organometallic group of the formula -M(OR')_n, whereby M is a metal selected from the group consisting of Al, Sn, B, Ti and V and n is the ligand number of ligands corresponding to the metal M; a phthalocyanin; a phthalonitril group; a monothiol; and a monothiolate group; R' being an alkyl;

Y is a functional group selected from the group consisting of NH₂; NHR'; NR'₂; an unsaturated residue; an acrylic acid group; a methacrylic acid group; methyl esters or ethyl esters; and

R represents -CH₂-.

27. (Cancelled)

18 17
28. (Original) A composite according to claim 26, wherein R represents a - (CH₂)- chain; $2 \leq n \leq 20$; and said chain is unhalogenated, contains aromatic units, and includes constituents selected from the group consisting of: -(CH₂)_iCH₃ where $0 \leq i \leq 5$, -O(CH₂)_jCH₃, or -O(CF₂)_iCH₃ where $0 \leq j \leq 4$, -CN and -NH₂; -CF₂-; -CH₂-CO-NH-CH₂-; -CF₂-CO-NH-CF₂-; -CH₂-CO-NH-CF₂-; and CF₂-CO-NH-CH₂-; and where -CN is a functional group selected from the group consisting of an activated carboxylic ester; an aldehyde group; an epoxide group; -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; or a functional group capable of forming a complex with at least one ingredient of a non-metallic medium.

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29. (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may be partially halogenated.

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30. (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may be perhalogenated.

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31. (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may contain thiophen units.

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32. (Original) A composite according to claim ~~28~~¹⁸, wherein said aromatic units may comprise constituents selected from the group consisting of: $-(CH_2)_iCH_3$ where $0 \leq i \leq 5$, $-O(CH_2)_jCH_3$, or $-O(CF_2)_jCH_3$ where $0 \leq j \leq 4$, $-CN$ and $-NH_2$; $-CF_2-$; $-CH_2-CO-NH-CH_2-$; $-CF_2-CO-NH-CF_2-$; $-CH_2-CO-NH-CF_2-$; and $CF_2-CO-NH-CH_2-$.

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33. (Original) A composite according to claim ~~31~~²¹, wherein said thiophen units comprise constituents selected from the group consisting of: $-(CH_2)_iCH_3$ where $0 \leq i \leq 5$, $-O(CH_2)_jCH_3$, $-O(CF_2)_jCH_3$ where $0 \leq j \leq 4$, $-CN$, $-NH_2$; $-CF_2-$; $-CH_2-CO-NH-CH_2-$; $-CF_2-CO-NH-CF_2-$; $-CH_2-CO-NH-CF_2-$; and $CF_2-CO-NH-CH_2-$.

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34. (Original) A composite according to claim ~~26~~¹⁷, wherein X is a functional group selected from the group consisting of the acid anhydride group of $-SH$; $-SiHCl_2$; $-SiH_2Cl$; $-Si(Cl)_3$; $-SiHBr_2$; $-SiH_2Br$; $-SiBr_3$; $-Si(R'(Cl)_2$); $-Si(OR')_3$; $-Si(R'(OR')_2$); $-COOH$; $-COCl$; $-PO_3H_2$, and $-SO_2H$.

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35. (Original) A composite according to claim ~~26~~¹⁷, wherein X is a functional group selected from the group consisting of the acid chloride group of $-SH$; $-SiHCl_2$; $-SiH_2Cl$; $-Si(Cl)_3$; $-SiHBr_2$; $-SiH_2Br$; $-SiBr_3$; $-Si(R'(Cl)_2$); $-Si(OR')_3$; $-Si(R'(OR')_2$); $-COOH$; $-COCl$; $-PO_3H_2$, and $-SO_2H$.

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36. (Original) A composite according to claim ~~26~~¹⁷, wherein R' is an alkyl selected from the group consisting of methyl, ethyl and propyl.

37. (Canceled)

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38. (Original) A cured composition obtained by vulcanization of a composite according to claim 1.

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39. (Original) A composition according to claim 38, wherein said composition is a pneumatic tire.

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40. (Original) A composition according to claim 38, wherein said composition is a hose.

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41. (Original) A composition according to claim 38, wherein said composition is a conveyor belt.

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42. (Original) A composition according to claim 38, wherein said composition is a pulley belt.